Chapter 9

Water Quality Protection Policies

RWSP water quality protection policies are intended to ensure that existing King County wastewater facilities and operations meet water quality standards and that planning for future facilities considers effects on the quality of the region's waters. The policies call for the county to participate in identifying and resolving regional water quality issues pertaining to public health and the environment to ensure protection of the public's investment in wastewater facilities and water resource management programs. The policies also call for the county to implement programs to support permit compliance, to forecast future aquatic resource conditions that may affect wastewater treatment decisions, and to participate with others in identifying ways to mitigate problems and enhance regional water quality.

In addition, RWSP water quality protection policy (WQPP)-5 specifies that the King County Executive implement a comprehensive water quality monitoring program of streams and water bodies that are or could be impacted by the wastewater system and that the executive submit summary reports and comprehensive reviews of this information to the King County Council as outlined in K.C.C. 28.86.165.[1] Appendix O contains the 2006 report.

This chapter provides an overview on implementation of the water quality protection policies from 2004 through 2006. In accordance with the RWSP reporting policies, this chapter also includes a summary of the activities carried out in 2006. The complete text of all the water quality protection policies, including information on policy amendments and a brief summary of how each policy was implemented in 2004–2006, is provided in Appendix H.

9.1 Implementation of Water Quality Protection Policies from 2004 through 2006

This section describes implementation of RWSP water quality protection policies in regard to identifying and resolving water quality issues, assessing risks, permit compliance, working with others to forecast future conditions and develop resource enhancement programs, and implementing a water quality monitoring program.

[1] In September 2006, the King County Council adopted Ordinance 15384, which amended this policy to include information and results of the water quality monitoring program in RWSP annual reports instead of as a separate report.

9.1.1 Identifying and Resolving Water Quality Issues and Assessing Risks to Public Health and the Environment

WTD routinely samples its effluent and the quality of the water near treatment plant and CSO outfalls. This sampling is done not only to meet regulatory requirements but also to quickly identify effluent quality issues that may require adjustments to operations or investigations into sources of particular pollutants.

King County's Trouble Call Program investigates water quality complaints, including wastewater overflows and leaks, in the greater King County wastewater service area. Services include taking samples and implementing emergency responses such as notifying public health agencies and posting signs. The program responded to about 110 incidents each year for the years 2004–2006. In 2004 and 2005, nine of the incidents were WTD-related. In 2006, twenty-four incidents were WTD-related, primarily because of the Barton force main breaks and the December windstorm.

In response to listings of fish species as threatened under the Endangered Species Act (ESA), WTD voluntarily began to develop a Habitat Conservation Plan (HCP) for WTD activities that could have an effect on these species. Although WTD decided in 2005 that the commitment of resources required to match the level of uncertainty was too substantial to continue the HCP process, the studies done in support of the HCP provided valuable direction for WTD activities and future studies. WTD is now seeking individual ESA consultations for projects with a federal link. All the materials and agreements that were developed in the first phase of the HCP were used in completing the federal permitting processes for the Brightwater facilities, the Carnation Treatment Plant, and other WTD construction projects. In addition, a small portion of the HCP budget was allocated to pursue a Programmatic Biological Assessment (PBA) for WTD construction activities and reclaimed water uses. These more focused agreements will streamline the ESA consultation process by getting advance approval for the majority of best management practices and methods of construction.

WTD is following the scientific and technical developments for emerging chemicals of concern such as endocrine disrupting chemicals (EDCs). Some of these chemicals may be found in stormwater and treated wastewater. In 2004, staff attended technical meetings to learn more about these chemicals and their potential effects and created a Web site that gives general information on the topic.[2] To further add to its understanding of EDCs, King County undertook some initial screening level sampling of its surface waters in 2003 and 2004 to determine if there are measurable suspected EDCs present. A report that describes these findings in detail was published in April 2007.[3] The Industrial Waste Program has been investigating industrial sources of some EDCs in the basin that drains to the Lower Duwamish Waterway as part of the effort to reduce sediment contamination in the waterway.

King County assesses the risk to human health and the environment from wastewater treatment and conveyance activities and uses this information in evaluating water pollution abatement

[2] http://dnr.metrokc.gov/WTD/community/edc/index.htm

[3] *Survey of Endocrine Disruptors in King County Surface Waters* is available at http://dnr.metrokc.gov/wlr/waterres/streamsdata/reports/Endocrine-disrupting-compounds.htm

control options. The Lower Duwamish Waterway Work Group (City of Seattle, Port of Seattle, Boeing, and King County) conducted human and ecological risk assessments as part of remedial investigation studies for the Lower Duwamish Waterway Superfund cleanup project. Phase 1 risk assessments were completed in 2003; draft Phase 2 baseline risk assessments were completed in 2006. The assessments will be used to evaluate the potential threat to human health and the environment from the waterway's contaminated sediment and water and to determine whether remedial action is necessary. King County completed a screening-level aquatic life risk assessment in 2005 for the Green River watershed as part of the Green-Duwamish Water Quality Assessment. WTD is using the results of the Green-Duwamish Water Quality Assessment in capital planning efforts, including planning for CSO control projects. The results are also contributing to salmon conservation planning and the Washington State Department of Ecology's (Ecology) Total Maximum Daily Load program. In addition, aquatic life, wildlife, and human health risk assessments in the greater Lake Washington watershed were completed in 2006.

9.1.2 Implementing and Maintaining Programs to Support Permit Applications and Compliance

WTD's core mission is to protect public health and the environment by collecting wastewater from local sewer systems and treating the wastewater to meet National Pollutant Discharge Elimination System (NPDES) limits before discharging the treated effluent to our water bodies.[4] To that end, WTD strives to design and operate its treatment and conveyance systems to meet or exceed standards and to prevent or minimize overflows of untreated or partially treated wastewater. The treatment plants and associated facilities continue to be in compliance with the terms and conditions of their NPDES permits and so are in compliance with the Washington State Water Pollution Control Act, the Federal Water Pollution Control Act, and the Federal Clean Water Act. The NPDES permits are renewed about every five to seven years; each renewal usually carries additional terms and conditions.

In 2006, a number of unusual events taxed the wastewater system. Early in the year, the Barton Force Main failed and was replaced. In November and December, extreme wind and rain storms—and associated power outages—occurred. During the November storms, the West Point and South treatment plants handled record flows without incident. Both plants reached or exceeded maximum capacity on several days. Many of the pump stations ran at capacity for days without any significant equipment failures. During the December storm, portions of the West Point plant were flooded and the plant lost treatment capability for several hours, 20 pump stations lost power and operated on emergency generators, and the North Mercer Interceptor ruptured.

Despite these conditions, neither West Point nor South plant experienced exceptions to NPDES secondary treatment permit limits in 2006. These plants also met their limits without exception in

[4] NPDES permits are issued by the Washington State Department of Ecology and set limits on the quality and quantity of effluent (treated wastewater) discharged from point sources such as treatment plants, CSOs, and industrial facilities.

2004 and 2005. Both plants received the National Association of Clean Water Agencies (NACWA) Platinum Peak Performance Award for operating five consecutive years with no permit exceptions. The Vashon plant experienced eleven exceptions in 2006, two in 2005, and none in 2004. The upgraded Vashon plant, which went online in late 2006, is expected to eliminate these periodic exceedances.

The number of sanitary sewer overflows (SSOs), however, increased in 2006 because of these extreme events.[5] In 2004 and 2005, the numbers of SSOs were below the 15-year annual average of 15 occurrences (8 SSOs in 2004 and 10 in 2005). In 2006, the number was 27, half of which resulted from the December storm and the Barton Force Main failure. An SSO must be reported to Ecology within five days after WTD becomes aware of the SSO. Operators should know immediately whether there is an SSO at a pump station because each pump station has level indicators with alarms. That is not the case for leaks/SSOs from pipelines, siphons, and force mains. In these cases, WTD relies on staff reconnaissance and phone calls from the public or other utilities.

King County's combined sewer overflow facilities are regulated through West Point's NPDES permit. WTD submits a report to the Ecology each year on the volume and frequencies of CSOs and on progress made to control its CSOs. King County began to develop plans for controlling CSOs as early as 1979, after treatment plants and conveyance lines were in place. By May 2005, with completion of the projects specified in the 1988 CSO plan and the Mercer/Elliott West and Henderson/Norfolk facilities, about 17 of King County's 38 CSOs were controlled.[6,7] The remaining 21 uncontrolled CSOs will meet state standards as projects listed in the RWSP are completed between 2012 and 2030 (see Chapter 5). Figure 9-1 shows the estimated CSO reduction from 1988 through completion of the RWSP projects in 2030. Almost 20 years of record demonstrate progress toward the control goal. As shown in Figure 9-2, volumes of untreated CSOs, on the whole, have been decreasing despite fluctuations in rainfall from year to year.[8]

Five facilities provide CSO treatment—the equivalent of primary treatment—to combined flows: the West Point plant, the Alki and Carkeek CSO treatment plants, and the new Mercer/Elliott West and Henderson/Norfolk systems. At West Point, the primary-treated CSOs are blended with the secondary-treated effluent. The blended effluent consistently meets NPDES limits for secondary-treated flows. West Point's renewed NPDES permit, which became effective in January 2004, required that beginning in January 2006, the Alki and Carkeek CSO treatment plants dechlorinate treated CSOs before discharge. Modifications were made to the plants to

[5] SSOs are discharges of wastewater from separated sewer systems and from combined systems when no rain is occurring. They can flow from manholes, broken pipes, or pump stations to city streets, water bodies, and basements. SSOs occur on rare occasions such as extreme storms and power outages.

[6] "Control" is defined as meeting the Washington State standard of an average of no more than one untreated discharge per year per outfall. An update and calibration of the hydraulic model, expected to be ready in 2007, will help to verify the control status of King County CSOs.

[7] See Chapter 5 for a description of the Mercer/Elliott West and Henderson/Norfolk facilities.

[8] The annual volume and frequency of combined sewer overflows (CSOs) are reported from the beginning of June in one year to the end of May in the next year. More information about specific CSOs can be found in the *Combined Sewer Overflow Program 2005–2006 Annual Report* at http://dnr.metrokc.gov/wtd/cso/library/AnnualReport/2005-06_CSOAnnual.pdf

meet this requirement, the plants began dechlorination on schedule, and staff are using the startup experience to fine-tune the systems.

The first two wet seasons of operation of the Mercer/Elliott West system provided WTD staff with opportunities to troubleshoot the new system and make adjustments where necessary. Despite startup challenges, the Mercer/Elliott West facilities greatly reduced the volumes of untreated CSOs discharged from the Denny and Dexter Regulator Stations. Additional corrections are anticipated to be made before the start of the 2007–2008 wet season, with the goal of fully meeting permit requirements. The Henderson/Norfolk system began full operation in the second half of 2006 after programming errors were identified and corrected. The system operated with only minor problems during the 2006–2007 wet season.

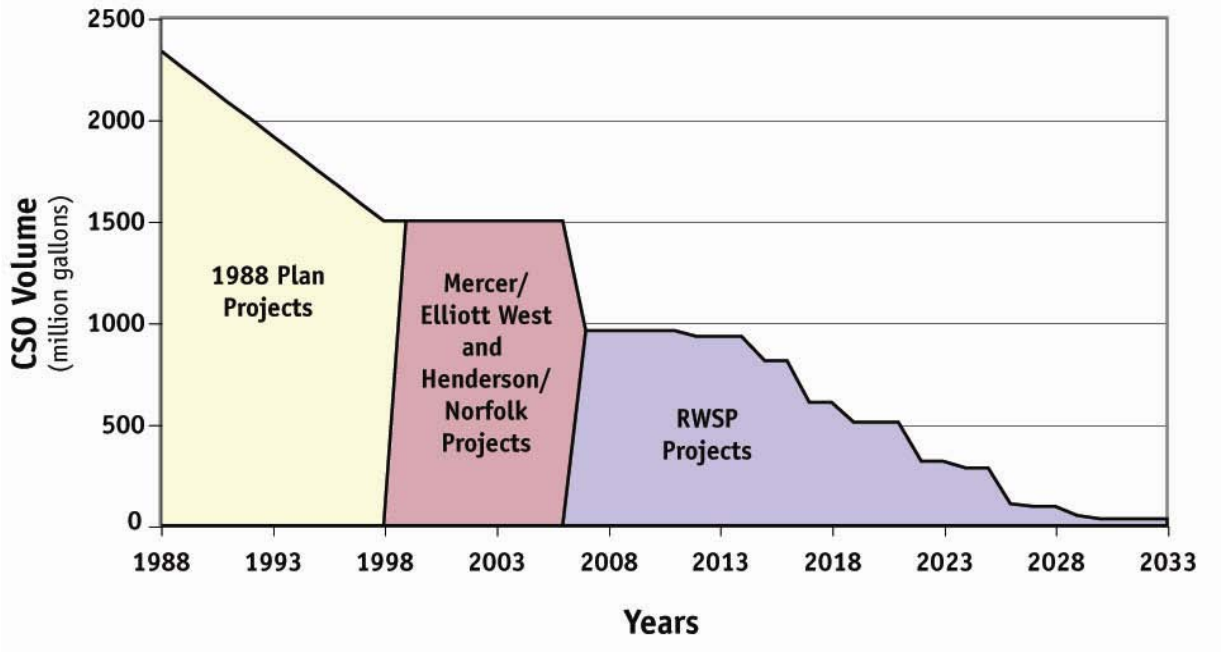

Figure 9-1. Actual and Planned CSO Reduction, 1988–2030

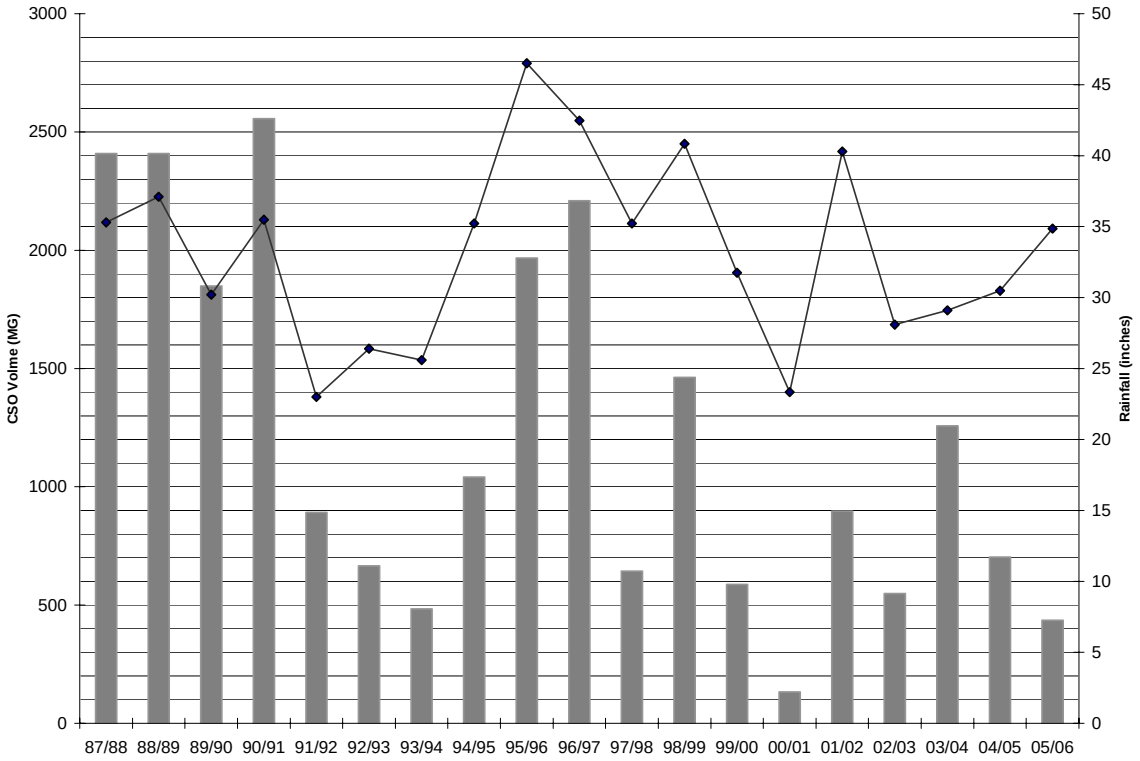

Figure 9-2. Annual CSO Volumes—1987 through 2006

The best way to protect our waterways is to control pollutants at their sources. Two programs work to prevent pollutants from reaching King County treatment plants—the Industrial Waste Program and the Local Hazardous Waste Management Program. Among other achievements, these programs have helped to reduce the levels of mercury in biosolids by 50 percent from levels in 2000 (Figure 9-3). The annual median concentration of mercury in South plant biosolids has continued to decline from 2004; the concentration at West Point has remained at about the 2004 level.

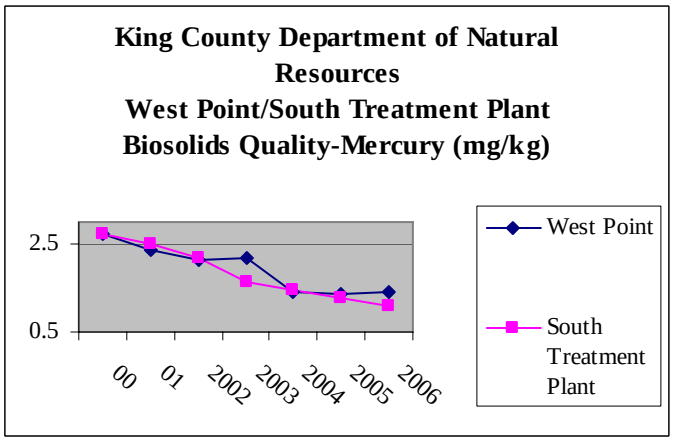

Figure 9-3. Decline of Mercury Concentrations in Biosolids, 2000 through 2006

9.1.3 Working with Others to Forecast Future Conditions and Develop Resource Enhancement Programs

King County routinely monitors and models the condition of county water resources and uses information from these efforts and from other programs in the region to identify trends.

In 2006, King County DNRP in partnership with Pacific Northwest National Laboratory completed an Integrated Water Resource Modeling System (IWRMS). The system integrates a collection of water resource models representing more than 60 watersheds, rivers, lakes, estuaries, and other water resources. It can predict the potential impacts of urban activities—including growth—on these resources. IWRMS will be used to evaluate diverse water, land use, population, and climate change scenarios and to inform decisions on complex issues such as drinking water withdrawal from urban lakes, instream flows for fish, wastewater capital project planning, and discharge of reclaimed water on agricultural fields.

In 2005, King County, in cooperation with other sponsors, held a climate change conference. Experts presented possible future effects of climate change on the region, including impacts on availability of water resources and on flood management. WTD may need to consider measures to prevent overflows, as evidenced in 2006, in light of possible increases in flooding and to further its mission to create resources from wastewater by exploring the reuse of treatment plant effluent. WTD will continue to monitor the growing information on climate change and sea-level rise and will accommodate this information in its plans as needed. For example, the design of new CSO control facilities or of modifications to existing facilities will consider climate impacts and sea-level change anticipated during the life of the facility. Possible accommodations could include increased sizing, higher facility elevations with respect to nearby water bodies, increased pumping, and enhanced flood and storm surge protections.

King County works with other entities in the region on water quality monitoring and protection programs, including studies done in support of salmon conservation in the two major watersheds in the county. King County works with Ecology and local jurisdictions on developing and implementing Total Maximum Daily Loads for impaired surface waters and to develop a more coordinated ambient monitoring program. It also participates in the Puget Sound Partnership—a public/private group convened by the Governor to develop an aggressive 15-year plan to solve Puget Sound's most vexing problems—and works with University of Washington researchers to understand and plan for climate change.

In addition, the county has worked with other agencies on sediment remediation and source control projects in the Duwamish River. Since 2000, King County, Port of Seattle, City of Seattle, and Boeing have been involved in efforts under the federal Superfund program to better understand the human and environmental risks from contaminated sediments in the Lower Duwamish Waterway and to take actions where necessary. King County was the lead agency, with participation by the City of Seattle and funding from the Elliott Bay/Duwamish Restoration Program, for remediation of the Diagonal/Duwamish site, completed in 2004.

In 2005, King County convened a regional water resources planning process to integrate reclaimed water and instream flows into water planning in the region. Participants include

representatives from tribes, local water and wastewater utilities, elected officials, environmental groups, and governmental agencies. Technical committees were formed to produce information based on best available science on seven topics: water demand forecast, water supply assessment, climate change impacts, reclaimed water, tributary stream flows, source exchange strategies, and small water systems. The participants may choose whether or how to use the products as they see fit, and the work of the committees does not in any way affect the authority of any of the participants in the planning process.

9.1.4 Implementing a Comprehensive Water Quality Monitoring Program of Streams and Water Bodies

WTD supports a number of water and sediment quality monitoring programs to assess its compliance with NPDES permit limits; to track water quality trends in water bodies in King County, particularly those that cross wastewater conveyance lines; to protect public health, including monitoring swimming beaches; and to support capital projects, CSO control and sediment cleanup, and partnerships with others in watershed protection and salmon recovery programs. Table 9-1 lists monitoring programs that are ongoing or that were in progress in 2006. Appendix O describes results of these programs in 2006. Annual water quality reports describe other programs completed in 2004 and 2005.[9]

[9] http://dnr.metrokc.gov/wtd/rwsp/library.htm#ProgressReports

Table 9-1. Summary of King County Water Quality Monitoring Programs

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Ambient Monitoring						
Marine monitoring	Water and sediments in areas of Puget Sound away from outfalls and CSOs; shellfish and algae from Puget Sound beaches	Water samples: temperature, salinity, clarity, DO, nutrients, chlorophyll, and bacteria Shellfish: lipids and metals	Water samples collected at multiple depths, ranging from 1 to 200 m Sediments and shellfish	Water samples: monthly Shellfish: annually; sediments: bi-annually	To assess potential effects to water quality from nonpoint pollution sources and to compare quality against point source data	Ongoing
Major lakes monitoring	Cedar-Sammamish Watershed (WRIA 08) only: Lakes Washington, Sammamish, and Union	Temperature, DO, pH, conductivity, clarity, phosphorus, nitrogen, and fecal coliform; micorcystin is measured at select stations	Samples collected every 5 m from 1 m below the surface to bottom at one station in center of lake and from the surface around various locations around the shoreline	Biweekly during the growing season; monthly during the rest of the year	To monitor the integrity of the wastewater conveyance system and the condition of lakes	Ongoing
Small lakes monitoring	Volunteers monitor 51 small lakes in King County	Precipitation, lake level, temperature, Secchi depth, phosphorus, nitrogen, chlorophyl-a, phytoplankton	Single-point and vertical profiles	Rainfall & lake level: daily Temperature & Secchi depth: weekly Other parameters: every 2 weeks April to October	To characterize and identify trends in water quality	Ongoing

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Rivers and streams monitoring	Rivers and streams of both watersheds; emphasis on those that cross wastewater conveyance lines or that could be a source of pollution	Baseflow and storm samples: turbidity, TSS, pH, temperature, conductivity, DO, nutrients, ammonia, bacteria Storm samples: trace metals Sediment quality at selected stations	Various	Monthly sampling under baseflow conditions; three to six times per year at mouth of streams under storm conditions	To monitor the integrity of the wastewater conveyance system and the condition of streams and rivers	Ongoing
Swimming beach monitoring	Cedar-Sammamish Watershed: Lake Washington, Lake Sammamish, and Green Lake	Bacteria	Water samples at swimming beaches	Summer	To evaluate human health risks and necessity for beach closures	Ongoing
Benthic macroinvertebrate monitoring	Wade-able stream sub-basins	Size and distribution of aquatic macroinvertebrate populations	Samples colllected with a Surber stream bottom sampler	Annually	To establish a baseline for identifying long-term trends	Ongoing
Wastewater Treatment Plant Outfall Monitoring						
Marine wastewater plant outfall water column and beach monitoring	Puget Sound water column at treatment plant outfalls; water and shellfish at beaches near outfalls	Water samples: temperature, salinity, clarity, DO, nutrients, chlorophyll, and bacteria Shellfish: lipids and metals	Water samples at outfalls collected at multiple depths, ranging from 1 to 200 m Shellfish	Water samples: monthly Shellfish: annually	To assess potential effects to water quality from wastewater discharges	Ongoing

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Marine NPDES sediment monitoring	Sediments in Puget Sound near treatment plant outfalls and the Denny Way CSO	Grain size, solids, sulfides, ammonia-nitrogen, oil & grease, TOC, metals, organic compounds, and (at South and West Point plants) benthic infauna	Sediment samples in a grid pattern as defined in the SAP approved by Ecology	Sediment samples at outfalls once per permit cycle (about every 5 years)	NPDES permit requirement	Ongoing
Special Studies						
Sammamish-Washington Analysis and Modeling Project (SWAMP)	Water and sediments in major lakes and their inflowing streams	Broad spectrum of water quantity and quality, sediment quality, biological, and physical parameters	Various	1999-–2003	To develop a computer model of the watershed	Completed in 2006
Ecological and Human Health Risk Assessment	Water bodies in Cedar-Sammamish watershed	Existing water, sediment, and tissue data	Various, using a tiered approach	Using existing data from other sampling efforts	To assess sampling program adequacy based on potential for chemicals to pose risks to aquatic life, wildlife, or human health	Completed in 2006
Green-Duwamish Water Quality Assessment (G-DWQA)	Water in Green and Duwamish Rivers and their inflowing rivers and streams	Broad spectrum of water quantity and quality, biological, and physical parameters	Various	Intensive	To develop models, evaluate BMPs, prepare risk assessments	Completed in 2006
Storm Impact Water Quality Monitoring	Water in Green and Duwamish Rivers and their inflowing rivers and streams under storm flow conditions	Broad spectrum of water quantity and quality, sediment quality, biological, and physical parameters	Various	Intensive	To evaluate conditions and to support modeling and WRIA planning	Completed in 2003; report issued in 2004

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Loadings Calculations	Water in Green and Duwamish Rivers and their inflowing rivers and streams	Broad spectrum of water quantity and quality, sediment quality, biological, and physical parameters	Estimates based on water quality data and on literature reviews for land use classifications		To estimate chemical loading to surface waters	Completed in 2006
Temperature and DO Studies	Water in Green and Duwamish Rivers and their inflowing rivers and streams	Daily fluctuations in temperature and DO, especially in the summer	Continuously recording data loggers	Intensive	To evaluate conditions and to support modeling and WRIA planning	Completed in 2003; temperature report issued in 2004; DO report completed in 2006
Microbial Source-Tracking Study	Green River and its tributaries	Land uses and bacterial sources associated with bacterial populations		Intensive	To assist in setting and measuring TMDLs	Completed in 2004; report completed in 2006
Brightwater Outfall Studies	Water, sediment, and eelgrass for the Brightwater outfall site Upland soils at outfall Portal 19	Water quality: temperature, salinity, DO, nutrients, and fluoresence Sediments: benthic community and chemistry	Water column samples and continuous buoy readings Surface sediments Eelgrass survey	Annual	Regulatory—to meet HPA and DNR outfall lease requirements	Through 2014
Brightwater Construction NPDES Stormwater Monitoring	Stormwater and surface water	Stormwater quality	Various	Intensive	To meet NPDES Construction Stormwater permit	Through 2010

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Denny Way/Lake Union pre-remediation sediment monitoring	Sediment near the Denny Way and Lake Union CSOs	Benthic communities, sediment chemistry	Sediment samples per approved SAP	Variable	Regulatory—under a NOAA Fisheries Section 7 ESA consultation	Through 2021
Diagonal/Duwamish post-remediation sediment monitoring	Sediments near the Seattle Diagonal storm drain (includes city and county CSO) and the county's Duwamish CSO	Sediment chemistry, turbidity, cap surveys	Sediment samples per approved SAP	Annual	Regulatory—under an EPA/Ecology Consent Order	Through 2013

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

9.2 Water Quality Protection Activities in 2006

RWSP reporting policies call for including in RWSP annual reports a summary of the Wastewater Treatment Division's water quality management programs and its compliance with the Endangered Species Act and with other agency regulations and agreements. This section reports on the progress of WTD's water management programs and compliance activities in 2006.

9.2.1 Wastewater Treatment Plant Capacity, Flows, and NPDES Compliance

On average, WTD's three secondary treatment plants process over 180 million gallons of wastewater each day. The quality of treated effluent from these plants remained high in 2006. Effluent values were typically far below the limits set in the wastewater discharge permits.

9.2.2 South Treatment Plant

The South Treatment Plant provides secondary treatment for wastewater flows from customers in the lower Green River basin, suburban cities east of Lake Washington, and Seattle's Rainier Valley, in addition to flows from parts of Snohomish and Pierce Counties. The South plant also treats septic tank solids from the region and sludge from treatment facilities in neighboring areas such as Snoqualmie Valley cities and Vashon Island.

The South Treatment Plant is designed to manage an average monthly wet-weather flow of 115 million gallons per day (mgd) with an effluent pumping capacity of 325 mgd. Its outfalls at Duwamish Head in West Seattle discharge secondary effluent into Puget Sound 10,000 feet from shore at a depth of 600 feet into the denser deeper water layer. The increasingly diluted effluent plume moves southward in the Sound, remaining at or below a depth of 390 feet.

Despite the fluctuation of flow volumes and influent composition, the South Plant's secondary treatment process consistently produces high quality secondary effluent. In 2006, the plant accepted 11.7 MG of septic tank solids. From November 2005 through April 2006, the plant managed an average wet-weather flow of 91 mgd.[10] Treatment efficiency remained high and consistent, even though primary and secondary treated effluent were blended for discrete periods of time during the high intensity and duration storms in November and December to maintain the optimum plant operation and to meet permit limits. No NPDES permit exceptions occurred during the year, and the plant earned the National Association of Clean Water Agencies

[10] For the South and Vashon plants, the average wet-weather flow (AWWF) is the average flow during the wet season, between November and April, on days when no rainfall has occurred on the previous day. For the West Point plant, the "non-storm" AWWF is calculated without counting the flow on days when it rains or the days immediately following a rain event.

(NACWA) Platinum Peak Performance Award for operating five consecutive years with no permit exceptions.

9.2.3 West Point Treatment Plant

The West Point Treatment Plant provides secondary treatment for wastewater from customers located in the greater Seattle area and in southwest Snohomish County. West Point is the largest plant in the King County system. This plant is designed to manage an average non-storm wet-weather flow of 133 mgd and a peak wet-weather flow of 440 mgd. After treatment, the secondary effluent is discharged through an outfall near the plant into Puget Sound. The outfall discharges 3,650 feet from shore at a depth of 240 feet. The increasingly dilute effluent plume flows northward most of the year, out of Puget Sound.

West Point is designed to provide secondary treatment for up to 300 mgd of wastewater. Capacity between the 300-mgd capacity for secondary treatment (defined as 2.25 times the average wet-weather flow of 133 mgd) and the 440-mgd peak capacity is used to manage captured CSO flows. After receiving CSO treatment (equivalent to primary treatment), these flows are mixed with secondary effluent for disinfection, dechlorination, and discharge at the deep marine outfall. The blended effluent must meet secondary effluent quality limits.

From November 2005 through April 2006, the average wet-weather flow through the West Point Treatment Plant was 87 mgd. No NPDES permit exceptions occurred during the year, although there were a number of reported sanitary sewer overflows (see the section on sanitary sewer overflows). The plant earned the NACWA Platinum Peak Performance Award for operating five consecutive years with no permit exceptions.

9.2.4 Vashon Treatment Plant

The Vashon Treatment Plant was originally designed to manage a monthly average flow of 0.264 mgd and a peak flow of approximately 1.0 mgd. In November 2006, the newly upgraded plant with increased capacity, began full operation (see Chapter 2). An outfall, which was extended in 2004, discharges 2,900 feet offshore to Puget Sound at a depth of minus 200 feet mean lower low water (MLLW). Also in 2006, Ecology approved the revised NPDES permit application for the upgraded facility.

From November 2005 through April 2006, the average wet-weather flow at the Vashon plant was 0.19 mgd. The plant experienced 11 NPDES permit exceptions during the year, including maximum and minimum pH exceedances, several total suspended solids limit violations, and one fecal coliform bacteria exceedance. These exceptions occurred before the upgraded plant went online.

WTD also owns and operates the Beulah Park/Cove Treatment Facility on Vashon Island. This facility collects wastewater from approximately 60 residences via a vacuum system and pump station; treats the wastewater with a series of septic tanks, recirculating sand filters, and ultraviolet disinfection; and then pumps the effluent to a drip field for percolation to subsurface

soils. King County reports quarterly on the operation of this facility. No violations of permit limits occurred in 2006.

9.3 Sanitary Sewer Overflow Prevention and Containment

Extensive resources have been committed to maintaining the integrity of the system and preventing sanitary sewer overflows (SSOs). WTD's Maintenance and Asset Management groups regularly inspect, maintain, and repair existing facilities to prevent mechanical failures and SSOs. In addition, WTD regularly updates its conveyance system improvement program to ensure that conveyance facilities keep pace with projected needs for increased capacity.

Table 9–2 provides details on SSOs that occurred in 2006. A total of 27 SSOs were reported during the year. The overflows ranged in size from 100 gallons to 25 million gallons. Eleven of the 27 SSOs resulted from the significant precipitation, severe winds, and ensuing power outages that occurred between December 14 and 16. Loss of power to pump stations caused several of these overflows. A series of ruptures and subsequent replacement of the Barton Force Main, which carries wastewater underground through Lincoln Park in Seattle, was responsible for three other SSOs during the year. Crews installed and operated a bypass line for over a month during force main replacement.

Six of the non-storm related SSOs occurred at the West Point Treatment Plant. On three occasions, a small volume of primary treated effluent was diverted around secondary treatment because of mechanical problems and then subsequently blended back into the secondary flow prior to discharge. The discharged blended effluent stayed within permit limits. The plant also experienced two brief periods when disinfection was not provided. On another occasion, primary effluent leaked to the ground as a result of a clogged valve that was stuck in the open position during digester tank refilling. The leak was contained and easily remediated. Finally, in December, mechanical problems at the plant prompted the discharge for a few hours of untreated or partially treated wastewater to Puget Sound. The causes of the mechanical problems are still being investigated.

While there may be some short-term risk to public health and the environment from SSOs, these volumes of releases do not produce long-term effects. In all cases, WTD overflow response procedures were implemented: posting the area, cleaning up the area as appropriate, and monitoring water quality in the vicinity of the overflow to determine when pollutant concentrations have returned to levels consistent with state Water Quality Standards.

Table 9-2. Sanitary Sewer Overflows in 2006

Date	Location	Estimated Volume (gallons)	Duration	Discharge Type	Receiving Water	Reason for Overflow
Jan. 8	West Point Treatment Plant	350,000	Unknown	Primary effluent	Onto the ground	A pressure relief valve was open, probably from debris, during digester refilling.
Jan. 15	Denny Way Regulator Station	110,000	1.7 hours	Untreated wastewater	Elliott Bay	Outfall gate was opened by vandals.
Jan. 17	Barton Pump Station	1,850,000	4 days	Untreated wastewater	Puget Sound	Break in Barton Force Main in Lincoln Park.
Jan. 24	West Point Treatment Plant	< 100,000	0.2 hour	Treated and disinfected wastewater	Diversion around secondary and blended with fully treated effluent	False reading because of faulty air valve in the influent pump station caused CSO gates to open about 55 percent.
Feb. 4	Barton Pump Station	Unknown	~2 days	Untreated wastewater	Puget Sound	Second break in Barton Force Main.
Feb. 17	Pacific Pump Station	1,000	~0.4 hour	Untreated wastewater	Into a resident's yard	Wet-well alarm caused pumps to shut down; possibly the result of a power failure.
Mar. 10	Barton Pump Station	180,000	3 hours	Untreated wastewater	Puget Sound	Emergency construction work to replace and connect the Barton Force Main to the pump station.
April 5	York Pump Station vault	100,000	0.75 hour	Untreated wastewater	Overland to Sammamish River	Guide that holds the float valve broke in the force main air/vacuum relief valve.
April 10	Barton Pump Station	13,000	0.25 hour	Untreated wastewater	Puget Sound	Emergency construction work to replace the Barton Force Mains required moving the temporary pump station connection to allow for welding.
April 18	West Point Treatment Plant	Unknown	0.75 hour	Treated effluent without disinfection	Puget Sound	Disinfection failure; lead chlorinator was not working.
Sept. 1	West Point Treatment Plant	300,000	5 min	Partially treated effluent	Puget Sound	False signal from corroded wire on level controller.
Sept. 14	South Michigan Regulator Station	500,000	~1 day	Combined wastewater and stormwater	Duwamish River	Stoplog failure; possibly triggered by high storm flow or by workers during stoplog replacement.
Oct. 7	West Point Treatment Plant	57,000	8 min	Partially treated effluent	Puget Sound	A pump failed at Influent Pump Station; variable speed drive was tripped by power supply alarm; could not identify the cause.
Nov. 6	Elliott West treatment facility	25,000,000	6.5 hours	Primary effluent with partial or no disinfection	Puget Sound	Late delivery of sodium hypochlorite; flow was discharged without chlorination for a portion of a discharge day.
Nov. 6	West Point Treatment Plant	Unknown	~0.5 hour	Treated effluent without disinfection	Puget Sound	Chlorine residual dropped below 0.05 mg/L during high flows; could not identify the cause; situation is being monitored.
Nov. 30	Interurban Pump Station	100	< 1 day	Untreated wastewater	Onto the ground near the Starfire Sports complex	Leak from the air/vacuum relief structure; relief value obstructions were removed.

Date	Location	Estimated Volume (gallons)	Duration	Discharge Type	Receiving Water	Reason for Overflow
Dec. 14-21	North Mercer Interceptor	~307,000	7 days	Untreated wastewater	Overflow on land	Major wind/rain storm and power outages; failure in area where pipe had been patched; flows were bypassed during repair.
Dec. 14	Elliott West treatment facility	Unknown	~1–2 hours	Combined wastewater and stormwater	Over land and into Elliott Bay	Major wind/rain storm and power outages; manholes near Denny structure popped; flow ceased when pressure was reduced.
Dec. 14	Juanita Bay Pump Station	2,000,000	5.5 hours	Untreated wastewater	Lake Washington	Major wind/rain storm tripped off the pumps.
Dec. 14	Hidden Lake Pump Station	~39,000	~2 hours	Untreated wastewater	Puget Sound	Pump station exceeded its capacity during major wind/rain storm; flow sent to a Ronald pump station.
Dec. 14-15	Yarrow Bay Pump Station	250,000	3.5 hours	Untreated wastewater	Lake Washington	Major wind/rain storm and power outages; operated with mobile generator.
Dec. 14-15	Medina Pump Station	1,000,000	6 hours	Untreated wastewater	Lake Washington	Major wind/rain storm and power outages; failure of wet-well level switch; because of conditions, travel time increased for workers to reach the station; operated with auxiliary generator.
Dec. 14-15	Murray Pump Station	3,400,000	10.5 hours	Untreated wastewater	Puget Sound	Major wind/rain storm and power outages; operated with mobile generator.
Dec. 14-15	Barton Pump Station	5,000,000	28 hours	Untreated wastewater	Puget Sound	Major wind/rain storm and power outages; inundated pumps and motors; operated diesel-powered temporary pump station and rebuilt one pump.
Dec. 14-15	West Point Treatment Plant	~66,200,000	3 hours	Untreated or partially treated wastewater	Puget Sound	Major wind/rain storm and power outages; raw sewage pumps failed, causing a cascade of shutdowns and the opening of emergency overflow gates; a second event triggered problems with the primary gates and major flooding in the plant; working to identify the causes.
Dec. 16	Kirkland Pump Station	60,000	2 hours	Untreated wastewater	Lake Washington	Major wind/rain storm and power outages; generator tripped off and was restarted.
Dec. 17	Sunset/ Heathfield Pump Station	~1,500,000–2,000,000	5.5 hours	Untreated wastewater	Lake Sammamish	Major wind/rain storm and power outages; mechanical failure of emergency generator; lake water entered station from manhole opening.

9.4 Combined Sewer Overflow Reduction

King County reports CSO data from the beginning of June in one year through the end of May in the next year. The following sections report untreated and treated CSO volumes and frequencies for the 2005–2006 reporting period.

9.4.1 Frequencies and Volumes of Untreated CSOs

During the June 2005–May 2006 wet season, the total volume of untreated CSOs was 435.78 MG (256.39 MG in the South Service Area; 135.30 MG in the North Service Area; and 44.09 MG in the Alki Service Area). This volume represents an 81 percent reduction over the 1981–1983 baseline volume of 2,339 MG.[11]

There were a total of 216 untreated CSO events (158 events in the South Service Area; 53 events in the North Service Area; and 15 events in the Alki Service Area) during this period.[12] This total represents a 54 percent reduction in frequency over the 1981–1983 baseline of 471 overflows.

Table 9-3 shows the 2005–2006 volumes and frequencies of untreated CSOs as compared to the baseline volume and frequency.

Table 9-3. Untreated CSO Volumes and Frequencies, 2005-2006

	CSO Annual Volume (MG)	CSO Annual Frequency (Events)
Baseline (1981–1983) at start of 1988 control plan	2,339	471
2005–2006 Northern Service Area	135.30	53
2005–2006 Southern Service Area	256.39	158
2005–2006 Alki Service Area	44.08	15
2005–2006 Total System	435.78	216

9.4.2 Frequencies and Volumes of Treated CSOs

Table 9-4 shows the volumes and frequencies of treated CSOs in 2005–2006. The discussion that follows the table provides more information on these discharges.

[11] King County uses the period between 1981 and 1983 as the baseline for measuring progress in controlling CSOs. Baseline volumes were determined using computer modeling.

[12] An overflow event is defined by the length of the dry period ("inter-event interval") after and before the overflow. Each "event" may last from a few minutes to many hours. This definition of an event reflects the expectation that all overflows resulting from a single rainstorm should count as only one overflow. The County uses a 24-hour interval.

Table 9-4. Treated CSO Volumes and Frequencies, 2005–2006

	CSO Annual Volume (MG)	CSO Annual Frequency (Events Treated)	CSO Annual Frequency (Events Untreated)
West Point Secondary/CSO Plant	546.98	32[a]	
Alki CSO Plant	59.4	4	
Carkeek CSO Plant	54.72	6	
Mercer/Elliott West CSO Treatment Facilities	315.6	8	7 at Denny Regulator Statiion
Henderson/Norfolk CSO Treatment Facilities	0	0	0 at Norfolk CSO outfall

[a] Number of days when flows received CSO treatment and were blended with flows that received secondary treatment

Carkeek and Alki CSO Treatment Plants

Starting January 1, 2006, additional permit limits went into effect for total residual chlorine and fecal coliform at the Carkeek and Alki CSO Treatment Plants. Dechlorination systems were installed and hypochlorite dosage controls were modified at the plants to prepare for these new limits. Six discharge events with a total discharge volume of 54.72 MG occurred at the Carkeek plant and four events with a total discharge volume of 59.4 MG occurred at the Alki plant during the 2005–2006 reporting period. Discharge effluent limits were met at both plants, except for fecal coliform during one event at Alki. These events provided staff with startup experience to help identify problems and make refinements to the dechlorination and hypochlorite systems.

Mercer/Elliott West CSO Treatment Facilities

The Mercer/Elliott West CSO Treatment Facilities began operating in May 2005. From June 2005 through May 2006, eight treated discharge events with a total discharge volume of 315.6 MG occurred at the Elliott West CSO outfall. Operation of the facilities has reduced the number of untreated discharges at the Denny Regulator Station from 32 to just 7 small discharges per year. This decrease represents a significant improvement, but the station has not yet reached the control goal of an average of one event per year. Operation of the facilities did not change the number of discharge events at the Dexter Regulator Station—also intended to be controlled by the facilities—but the volume of discharge was much smaller than before the facilities went online. Seventy-four percent of the volume that had previously been discharged untreated at the Dexter Regulator Station received full secondary treatment at the West Point Treatment Plant. An investigation into refinements to bring the station into full control identified some promising control changes, such as reprogramming setpoints. A new programmable logic controller will be installed and the programming changes will be made before the 2007–2008 wet season.

Of the volume of combined sewer flows to be managed at these facilities, 38.4 percent was transferred to West Point, 61.4 percent received primary treatment and disinfection at the

facilities, and only 0.2 percent was discharged untreated at the Denny Regulator Station. The ratio of treated discharge to transferred flow is greater than planned, likely because of the hydraulic problems discovered later during the unusually large storms in November and December 2006. Because of these hydraulic problems—along with problems with the samplers and with the disinfection and dechlorination systems that may have been exacerbated by the hydraulic problems—discharge effluent limits for the Elliott West Treatment Facility were not met.

The hydraulic problems prompted modifications to facilities and procedures. The duck bill valve on the deeper outfall was removed because it appeared to have caused unanticipated loss of pressure. A flapgate installed during construction had made the valve unnecessary. Modifications to the samplers and flow meters are in progress. Other modifications are planned to improve the inadequate air release from the dechlorination structures that caused damage to the Denny Regulator plaza during the storms.

In addition, the efficacy of the screens at the Elliott West facility is being evaluated. The purpose of the screens is to prevent solids and floatable materials from going through the outfall. Since coming online, the screens have been adversely impacted both by storm flows and by non-storm base flows entering the Mercer Tunnel from the City of Seattle's East Lake Union system. In spring 2006, Seattle cleaned pipelines that were causing backup of flow to the tunnel. The cleaning decreased but did not eliminate base flow to the tunnel. Seattle is inspecting additional lines to identify possible causes. Decisions on next steps, including modifications to weirs, will be made after the inspections. Seattle and King County will try to complete these corrections before the start of the 2007–2008 wet season, with the goal of meeting permit requirements.

Henderson/Norfolk CSO Treatment Facilities

The Henderson/Norfolk CSO Treatment Facilities began operating in May 2005. Because of programming errors, the Henderson Treatment Tunnel did not operate during the June 2005–May 2006 period and, as a consequence, staff gained limited startup experience. No discharges occurred at any of the CSO locations controlled by this project. All of the untreated CSO volumes that would have previously discharged at these locations were transferred to South plant for full secondary treatment and disinfection. After the errors in programming were identified and corrected, the tunnel operated in the second half of 2006.

9.5 Industrial Waste Program

9.5.1 Permits, Authorizations, and Enforcement

The Industrial Waste Program (IWP) regulates industrial wastewater discharged into the King County wastewater system. The purpose of these activities is to ensure that industries treat wastewater for harmful substances such as metals, oils, acids, flammables, organic compounds, gases, and solids before discharging the wastewater to sewers. This program protects surface water and biosolids quality, the environment, public health, and the wastewater system and its workers.

IWP may regulate any industry, from largest to smallest, if the industry discharges to the wastewater system. To do this, the program issues three main kinds of discharge approvals: permits, discharge authorizations, and letters of authorization. Letters of authorization are issued for limited duration construction dewatering discharges. Discharge authorizations are issued to smaller industries. Permits are issued to industries that discharge more than 25,000 gallons per day and/or that are included in federally regulated categories. The Environmental Protection Agency (EPA) requires at least 20 categories of industries to get permits, whatever their size or quantity of wastewater. Permits have more comprehensive operating and self-monitoring requirements than discharge authorizations.

Discharge of fats, oil, and grease from a petroleum or mineral origin (nonpolar FOG) is limited to 100 mg/L. Industries must use oil/water separators to pretreat oily wastewater to prevent harm to the biological phase of wastewater treatment and must submit plans for the separators to the local sewer utility or to IWP for review and approval before installing the separators. FOG from an animal or a vegetable origin (polar FOG) can block sewer lines. Although polar FOG has no numerical limit, dischargers are required to minimize free-floating polar FOG and may be required to complete a FOG control plan for King County's review and approval.

IWP investigators inspect facilities before issuing discharge approvals and also inspect facilities with approvals to see that they are complying with regulations. Most companies are required to self-monitor their discharges. Industrial waste specialists take verification samples at facilities with permits to see whether wastewater discharges comply with regulations. If they find violations, the specialists conduct follow-up inspections and sampling.

The program issues a Notice of Violation when a company discharges more contaminants or volume than allowed, violates conditions of its discharge approval, or fails to submit required reports. For enforcement, IWP uses tools such as compliance schedules, fines, charges for monitoring and inspections, and cost recovery for damages.

In 2006, 128 permits and 302 industrial waste discharge authorizations were in effect and 376 inspections were conducted. Table 9–5 shows the number of compliance samples collected versus the number of violations detected. During 2006, IWP issued Notices of Violation to 39 companies for 70 violations. These violations consisted of the following (with several companies having multiple violations in more than one category):

- Twenty-four companies had 41 discharge violations, including those based on self-monitoring data
- Five companies had 8 permit/code violations
- Thirteen companies had 21 reporting violations

The company with the most discharge violations (13) was Puget Sound Recycling, a centralized waste treatment facility located in Auburn. This company was fined $2,300, constituting the major portion of the $2,800 in fines issued during the year. Also in 2006, Argent Laboratories started making monthly payments on a $23,894 fine issued in 2005. Argent Laboratories placed an appeal before the King County Hearing Examiner, but subsequently withdrew the appeal before it could be heard.

None of the violations in 2006 caused NPDES exceptions at King County treatment facilities.

Table 9-5. Number and Type of Compliance Samples of Industrial Wastewater Collected in 2006

	Compliance Monitoring	Post-Violation	Discharge Violation[c]
Cyanide amendable to chlorination	28		
Total cyanide	140		2
Metals	490	3	6
Organics			
BNA	53		5
VOA	155		
Fats, oils, and grease			
Total	0		
Polar[a]	24		
Nonpolar	355		
pH (Field)[b]	539	1	11
Surcharge	263		

[a] The polar fats, oils, and grease (FOG) analyses are for the visual free-floating FOG test, not laboratory analyses.

[b] The number of pH samples is somewhat misleading because it shows only discrete pH samples collected and analyzed in the field. The number does not include readings from continuous pH measurements.

[c] The discharge violations do not include those based on self-monitoring data.

9.5.2 Categorical Pretreatment Regulation Activity

IWP staff have been devoting significant time to addressing the issues involved in implementing the *Final Pretreatment Streamlining Rule* issued by the EPA in 2005. The rule has the potential to reduce the costs both for regulatory agencies such as IWP and for the regulated community. Its purpose is to reduce the burden of and to provide flexibility in technical and administrative requirements while continuing to protect the environment. For example, one provision has the potential to reduce IWP monitoring from twice per year to once every other year or to once per year, depending on the industrial discharger, which could lower fees of permit holders receiving the reduced monitoring. While parts of the rule were effective immediately, others will require revisions to King County Code and IWP public rules before they can be enacted. These revisions are expected to occur late in 2007.

One of the amended sections of the rule requires that permitting authorities evaluate whether each permitted facility needs a slug (spill) discharge control plan and/or takes other related actions to control slug discharges. In July 2006, IWP sent letters to all significant industrial dischargers (permit holders) notifying them of the requirement to file a Slug Discharge Control Plan by October 15, 2006. All dischargers complied with this requirement.

9.5.3 Dental Waste Program

About half of the metal in dental amalgam, the silvery material used to fill cavities in teeth, is mercury. An estimated 300,000 amalgam fillings (representing more than 250 pounds of mercury) are replaced each year by King County dentists. IWP's Dental Waste Program allows dentists to install an approved pretreatment unit commonly known as an amalgam separator unit (ASU) to demonstrate their compliance with the county's mercury limits without having to sample their wastewater and submit periodic self-monitoring reports. To ensure that the program is working, IWP performs random inspections of dental offices and monitors the levels of mercury in the biosolids produced at the regional wastewater treatment plants.

In 2006, IWP inspected 107 dental offices. Less than five of the offices were out of compliance and needed to install or maintain the appropriate pretreatment devices. King County also continued its participation in a national study of mercury concentrations in the treatment plant influent, effluent, and biosolids under the auspices of NACWA.

While it is difficult to precisely quantify the benefits of this program, there has been over a 50 percent reduction in the amount of mercury in King County biosolids from 2000, the year before IWP began implementing the program, to 2004, the year in which 97 percent compliance was achieved. The annual median concentration at the West Point and South treatment plants in 2006 was between 1.0 and 1.25 milligrams per kilogram (mg/kg), which is far below the federal standard of 17 mg/kg. Concentrations of other metals in biosolids are also below federal standards (see Chapter 6).

9.5.4 Lower Duwamish Waterway Source Control Project

Since 2002, the Industrial Waste Program has been working on the Lower Duwamish Waterway (LDW) Source Control Project in support of the WTD's Sediment Management Program. IWP has been coordinating with sediment cleanup efforts to help identify and manage sources of chemicals that reach site sediments.[13] Its goals are to minimize the potential for chemicals in sediments to exceed the state's Sediment Management Standards (WAC 173-204) and the LDW sediment cleanup goal. (See Chapter 5 for more information on the Sediment Management Program and Lower Duwamish Waterway cleanup efforts.)

Lower Duwamish Basin

- **Sampling of Industrial Sewer Dischargers for Phthalates.** Between March and November 2006, IWP collected 34 samples from industrial dischargers in the Lower Duwamish drainage basin. The chemicals of concern for the sampling were two phthalates: bis-2-ethylhexyl phthalate (BEHP) and butylbenzyl phthalate (BBzP). IWP will explore whether there are controllable industrial sources of these chemicals and will report results of the sampling and analyses in 2007.

[13] Investigations have determined that sediment in the Lower Duwamish Waterway contains phthalates (plasticizers) as well as polychlorinated biphenol (PCBs), polynuclear aromatic hydrocarbons (PAHs), metals (arsenic and mercury), and other organic compounds.

- **Air Deposition Sampling.** IWP is collecting rainwater samples at five locations in the Lower Duwamish drainage basin: Beacon Hill, Duwamish Industrial Area, Georgetown, King County Airport, and South Park. The samplers collect both rainfall and dry dust that falls into the sampler. Staff are measuring the amount of chemicals that deposit into the sampler over time (the rate of deposition) and analyzing samples for specific chemicals, including phthalates, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). The current phase of sampling started in October 2005 and is scheduled for completion in March 2007. So far, nine rounds of samples have been collected and analyzed.
- **Duwamish River Festival.** IWP played an important role in organizing King County's participation in the Duwamish River Festival held on August 12, 2006, at Duwamish River Park in the South Park neighborhood of Seattle.

Duwamish/Diagonal Sub-Basin

- **CSO Characterization.** In late March and early February 2006, IWP collected one round of samples at two locations in the Duwamish/Diagonal CSO/storm drain basin in order to characterize the water quality of CSO events. Additional CSO characterization sampling is planned for 2007.

Slip 4 Outfall Sub-Basin

- **Source Tracing at King County International Airport.** IWP collected samples in areas of the King County Airport that drain to Slip 4. The purpose of the sampling was to determine if existing sources of contamination are sufficiently controlled to allow a proposed sediment remediation project to proceed at Slip 4 in 2007–2008.

Work Group Participation

- **Lower Duwamish Waterway – Source Control Work Group.** IWP continued its participation in the Lower Duwamish Waterway Source Control Work Group—a group consisting of King County, Port of Seattle, City of Seattle, and the two agencies with regulatory responsibility for different aspects of Lower Duwamish Waterway sediment remediation (Washington State Department of Ecology and EPA). This ongoing group was formed to discuss source control issues that can affect the sediment remediation of the Lower Duwamish Waterway.
- **Lower Duwamish Waterway – Source Control Focus Group.** IWP continued its participation in the Lower Duwamish Waterway Source Control Focus Group. This ongoing group was formed to provide a forum for members of the Source Control Work Group to discuss source control issues with Lower Duwamish Waterway stakeholders.
- **Sediment Phthalate Work Group.** IWP is participating in an interagency work group to evaluate the potential of phthalates to contaminate sediments in fresh and marine sediments of Washington State. The group is looking at environmental occurrence,

sources, risks and receptors, source control and treatment, and regulatory aspects of phthalate sediment contamination. The work is expected to be completed by mid 2007.

9.6 Local Hazardous Waste Management Program

The Local Hazardous Waste Management Program (LHWMP) in King County is a regional program that complements WTD's efforts to protect water quality. LHWMP brings together resources from four local government agencies and 37 suburban cities to protect and enhance public health and environmental quality by helping citizens, businesses, and government reduce the threat posed by the production, use, storage, and disposal of hazardous materials. The program is a regional partnership comprising King County Water and Land Resources Division and Solid Waste Division, Seattle Public Utilities, Public Health–Seattle & King County, and the Suburban Cities Association. In 2006, WTD paid more than $2 million into the Local Hazardous Waste Fund to support LHWMP. This contribution comes from King County Board of Health fees levied per million gallons of wastewater treated at wastewater treatment plants in King County's service area.

The Program provides collection and recycling services for household hazardous materials and wastes and offers public outreach aimed at proper handling and reduction in use of hazardous products. It also provides technical assistance, incentives, and recognition to businesses that generate small quantities of hazardous waste.

9.6.1 Waste Disposal and Recycling

LHWMP provides King County residents with household hazardous waste collection services at the Household Hazardous Wastemobile, which travels throughout the county and at three fixed facilities located in Factoria (Bellevue), North Seattle, and South Seattle. In 2006, the Program collected 2,970 tons of household hazardous waste from more than 52,400 customers at these collection facilities:

- 16,225 customers brought 943 tons into the North and South Seattle sites
- 17,930 customers brought 832 tons into the Factoria drop-off site
- 18,260 customers brought 1,025 tons to the Wastemobile

The Program's suburban city partners sponsored 47 events that resulted in the collection of an additional 184 tons of waste. Also, more than 260,400 gallons of used motor oil were collected at public and private collection sites throughout the county. Were it not for LHWMP's collection services, much of this waste could have ended up in regional landfills, sewers, storm drains, and the environment.

In addition, program staff responded to 143 complaints regarding abandoned or improperly stored/disposed of hazardous waste.

Several LHWMP projects work to reduce the use of mercury and ensure its proper disposal. In 2006, LHWMP spurred the collection and appropriate disposal or recycling of at least 268 pounds of mercury through the following activities:

- The EnviroStars program recognizes businesses that have taken steps to reduce pollution and to properly manage their hazardous wastes. During 2006, four King County dentists became new EnviroStars in recognition of their efforts to prevent discharge of mercury to sewers. Currently, a total of 81 dentists in the county are EnviroStars.
- Between 3.5 and 6.5 million fluorescent lamps, containing 132 to 321 pounds of mercury, are disposed of in King County each year. An estimated 37 percent of the mercury is recycled. In 2006, approximately 1.3 million lamps were recycled as the result of LHWMP outreach efforts and incentives to businesses and others.
- LHWMP is working with other local organizations to expand the Take-It-Back Network. This network, composed of a group of retailers, repair shops, charitable organizations, and others, provides residents and businesses with options for recycling fluorescent tubes and other wastes—and their hazardous components—in a safe and cost-effective manner. In 2006, the Take-It-Back Network collected 8,290 fluorescent bulbs and tubes.
- Program staff participated with six other Washington jurisdictions in a five-state pilot project to determine the feasibility of collecting mercury-containing thermostats at local household hazardous waste collection facilities. The Product Stewardship Institute and the Thermostat Recycling Corporation coordinated the project, which ran from May to December 2006. Because of the project's success, the corporation agreed to make the program permanent and extend it to all household hazardous waste programs nationwide.

In addition, LHWMP is participating in a statewide medicine take-back pilot project. The project began in October 2006. There are 11 sites in operation, all at Group Health clinics. Since the project was launched, more than 1 ton of unused medicines has been collected. More information on this project is available at http://www.medicinereturn.com/

9.6.2 Community Outreach/Technical Assistance, Recognition, and Incentives for Businesses

During 2006, the Local Hazardous Waste Management Program provided a wide range of services to businesses and residents throughout King County. The Program reached approximately 58,000 residents with information on ways to reduce their use of hazardous products. Program staff also worked one-on-one with more than 1,800 businesses in King County. Highlights include:

- Teaching garden clubs, community groups, nursery staff, and landscape professionals about natural yard care and integrated pest management techniques.
- Offering new parents, community groups, and other residents information about green cleaning techniques and how to provide toxic-free homes and gardens.
- Teaching students and educators about hazardous products and ways to reduce them.

- Providing guidance to the community through the Household Hazards Line and the Natural Lawn & Garden Hotline.
- Providing technical consultations, fact sheets, brochures, and the Business Waste Line to help small businesses understand how to properly use, store, manage, and dispose of hazardous products and wastes. The Business Waste Line assisted more than 1,700 callers in 2006, and field staff made over 1,800 technical assistance visits to approximately 1,300 businesses.
- Offering industry-specific information about ways to reduce the use of toxic and hazardous materials.
- Giving limited financial assistance to qualified businesses to facilitate waste disposal/reduction. The Voucher Incentive Program will reimburse businesses for half of their disposal/reduction costs, up to a total of $500. In 2006, the program reimbursed 204 businesses a total of approximately $84,000.
- Recognizing businesses, through the EnviroStars program, for their efforts to reduce pollution. In 2006, thirty-six businesses became new EnviroStars and twelve businesses increased their EnviroStar rating. As of the end of 2006, there were 367 EnviroStar businesses.
- Operating the Industrial Materials Exchange (IMEX), which matches businesses that no longer need a hazardous material with businesses that have a need for that material. IMEX has an online listing of available and wanted materials.[14] During 2006, IMEX documented 73 exchanges of 55.8 tons of material, which saved King County businesses approximately $272,800.

9.7 Compliance with the Endangered Species Act

9.7.1 Programmatic Biological Assessment Agreements

The listings of chinook salmon, bull trout, and now Puget Sound Steelhead as “threatened” and the Orca as “endangered” under the Endangered Species Act (ESA) require that many WTD projects that need a federal permit go through an ESA Section 7 consultation process with NOAA Fisheries and U.S. Fish and Wildlife Services (“the Services”).

After the Habitat Conservation Plan effort was halted in 2005, WTD continued to pursue focused programmatic agreements on specific WTD activities and to continue meetings and dialogue with the Services to ensure that the Section 7 consultation processes are as streamlined and as timely as possible. WTD has developed an agreement on construction activities and is currently working on a technical memorandum regarding the impact of the use of reclaimed water on listed species.

[14] http://www.govlink.org/hazwaste/business/imex/index.html

The results of these activities continue to provide a benefit to the ESA consultations required for the Brightwater System, the Carnation Treatment Plant, pending CSO projects, and other large WTD construction projects that require a federal permit.

9.7.2 Endocrine-Disrupting Chemicals

Endocrine-disrupting chemicals (EDCs) are natural or synthetic chemicals that interfere with or mimic the hormones responsible for growth and development of an organism. Information is continually emerging about these natural and synthetic chemicals that people and industries use every day and dispose of down their drains and toilets. Because the potential impact of EDCs on aquatic life and wildlife is an issue of national and international scope, it is beyond the capability of a local agency or utility to solve alone. Studies will continue for many years before definitive answers are known and regulations adopted.

King County scientists are tracking this issue carefully to keep up-to-date on new findings. King County's Environmental Laboratory is investigating new analytical methods for the complex testing of some of these chemicals. Sampling for 15 suspected EDCs in the county's marine and fresh waters found low levels of five types of EDCs: natural estrogen (estradiol), synthetic estrogen (ethynylestradiol), plasticizers (phthalates), surfactants from soaps (nonylphenol), and epoxy compounds (Bisphenol A). A report titled *Survey of Endocrine Disruptors in King County Surface Waters* that describes these findings in detail was published in April 2007. More information about this work can be found at http://dnr.metrokc.gov/wlr/waterres/streamsdata/reports/Endocrine-disrupting-compounds.htm.

Conventional secondary wastewater treatment, designed to remove solids and biodegradable organic material from wastewater, removes from 50 to 90 percent of many compounds known to be or suspected of being EDCs. Controlling chemicals at their source is the easiest and least expensive way to protect the environment and people from the harmful effects of all pollutants, including EDCs. WTD will continue its efforts to protect water quality and will adapt its programs, if needed, as more definitive information on EDCs emerges. For more information, visit WTD's EDC Web site at http://dnr.metrokc.gov/WTD/community/edc/